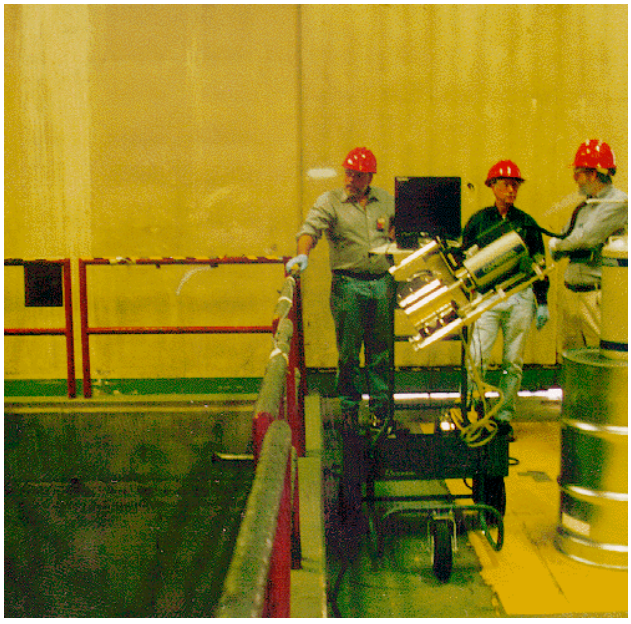
Technology Demonstration Summary Sheet
In-Situ Object Characterization System (ISOCS)?

THE NEED

In D&D projects there is a need for a gamma-ray assay system to determine the type, extent, and quantity of radioactive material present for planning purposes, and to quantitatively characterize material being readied for disposal. Because of the wide range of activities in which this gamma-ray system is used, it must be portable, easy to use, and capable of analyzing a variety of source geometries in which radioactive contamination is found. In addition, to avoid costly delays, the analysis should be available in situ. The In Situ Object Counting System (ISOCS) is a Germanium-detector gamma-ray characterization system that can identify specific nuclei, and quantitatively determine the corresponding radioactive inventory in situ. The corresponding baseline system is a Gemanium detector that has been calibrated with radioactive sources and an off-line shielding code.

THE TECHNOLOGY

The Canberra ISOCS system consists of (1) an ISOCS characterized Germanium detector with portable cryostat, (2) a cart support for holding the detector, lead shielding and collimators, (3) an InSpector portable spectroscopy analyzer, (4) a portable computer with Genie-PC software, and (5) the ISOXSW in situ calibration software. The ISOCS characterized detector is a Germanium detector whose response to a series of point sources surrounding it have been characterized using a Monte Carlo code. The steel-jacketed lead shielding can be mounted around the Germanium detector to provide 1 or 2 inches of shielding from background radiation, and to change the field of view between 30, 90 or 180 degrees. The detector rotates on the cart for alignment with the target. The computer controls the InSpector multichannel analyzer and the Genie-PC software provides peak identification, data and error analysis, and system quality assurance. The ISOXSW software is the key feature of the system in that it automatically determines the relationship between the radioactive source geometry, the measured count rate, and the amount of radioactive material present using the ISOCS characterized detector data.



ISOCS Measuring a Pool Wall at the CP-5 Facility

THE DEMONSTRATION

ISOCS was demonstrated at Argonne National Laboratory as part of the CP-5 Large Scale Demonstration Program funded by DOE's Morgantown Energy Technology Center (METC) for the D&D focus area. The device was used to
identify specific radioactive materials and to quantify the amount of radioactive isotopes present.

THE RESULTS

The ISOCS system performed without any major problems. The system was easy to use, but it does require extensive operator training to become proficient in its operation. Key features of the system that were found to be useful are the isotope identification system, and the statistical package for error analysis. An important feature of the system was its ability to collect data in the background while processing previously collected data.

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